

Docket No.: 20272-00722-US  
(PATENT)

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Patent Application of:  
Michael Scorer

Application No.: Not Yet Assigned

Confirmation No.:

Filed: Concurrently Herewith

Art Unit: N/A

For: MICROWAVE TRANSITIONS AND ANTENNAS

Examiner: Not Yet Assigned

**CLAIM FOR PRIORITY AND SUBMISSION OF DOCUMENTS**

MS Patent Application  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

Applicant hereby claims priority under 35 U.S.C. 119 based on the following prior foreign application filed in the following foreign country on the date indicated:

<u>Country</u>	<u>Application No.</u>	<u>Date</u>
United Kingdom	0302584.8	February 5, 2003

In support of this claim, a certified copy of the said original foreign application is filed herewith.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 22-0185, under Order No. 20272-00722-US from which the undersigned is authorized to draw.

Dated:

1/28/04

Respectfully submitted,

By



C. Keith Montgomery

Registration No.: 45,254

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INVESTOR IN PEOPLE

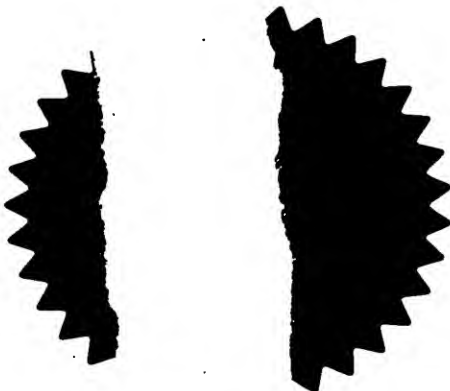
The Patent Office  
Concept House  
Cardiff Road  
Newport  
South Wales  
NP10 8QQ

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

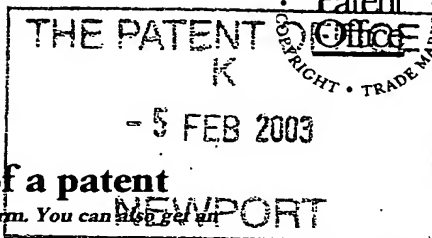
Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.



Signed

Dated 17 December 2003

Patent Act 1977  
(Rule)



1/77  
05FEB03 E7B2509-1 C26047  
P01/7700 0.00-0302584.8

The Patent Office

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NP10 8QQ

# Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

1. Your reference

0300030

2. Patent application number

(The Patent Office will fill in this part)

0302584.8

05 FEB 2003

3. Full name, address and postcode of the or of each applicant (underline all surnames)

SMITHS GROUP PLC  
765 FINCHLEY ROAD  
LONDON  
NW11 8DS

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

GB

08461352001

4. Title of the invention

MICROWAVE TRANSITIONS AND ANTENNAS

5. Name of your agent (if you have one)

J. M. FLINT

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

765 FINCHLEY ROAD  
LONDON  
NW11 8DS

Patents ADP number (if you know it)

1063304001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number  
(if you know it)

Date of filing  
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing  
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

- a) any applicant named in part 3 is not an inventor, or
  - b) there is an inventor who is not named as an applicant, or
  - c) any named applicant is a corporate body.
- See note (d))

YES

## MICROWAVE TRANSITIONS AND ANTENNAS

This invention relates to microwave transitions and antennas.

The invention is more particularly concerned with transitions between a coaxial connection and a sidewall of a waveguide, such as in an antenna.

Waveguides, such as for radar antennas, generally have a rectangular section and connection is usually made to the broader side wall or to the end wall of the waveguide by a coaxial connection. Such arrangements present no particular difficulties in producing a good performance and wide bandwidth. It can, however, be advantageous in some circumstances to make connection to the narrow wall, such as in order to produce a compact configuration. If connection is made to the narrow wall it usually produces a poor performance and narrow bandwidth.

It is an object of the present invention to provide alternative microwave transitions and antennas

According to one aspect of the present invention there is provided a microwave transition including a waveguide of rectangular section having a narrow wall and a broad wall, a conductor extending through the narrow wall of the waveguide and attached with a transition plate at its internal end, the plate being aligned centrally of the waveguide and extending lengthwise in contact with an internal surface of the broad wall, and the transition plate having a height that is greater adjacent the conductor than away from the conductor.

Figure 8 is plan view of the alternative transition; and

Figure 9 is a perspective view of a right-angle conductor of the alternative transition.

With reference first to Figure 1 there is shown a marine radar antenna, similar to that described in GB 02257743.1, extending in a horizontal direction 1 and arranged to direct a beam of radiation in a second horizontal direction 2, which is near orthogonal to the first horizontal direction. The antenna is supported by a mount (not shown) for rotation about a vertical axis 3 so that the radiation beam is swept in azimuth.

The antenna includes a waveguide 4 extending across the width of the antenna at its rear side. The waveguide 4 is of hollow metal construction and rectangular section. The waveguide is terminated at one end by a short circuit wall 60 and at its opposite end in a matched load 61. The forward-facing vertical face 5 of the waveguide 4 is slotted in the usual way so that energy is propagated from this face. This face 5 is spaced a short distance to the rear of a polarisation grid 6. Energy is supplied to and from the left-hand end of the waveguide 4 from a conventional source (not shown) via a transition, indicated generally by the number 10, having a coaxial transmission line input.

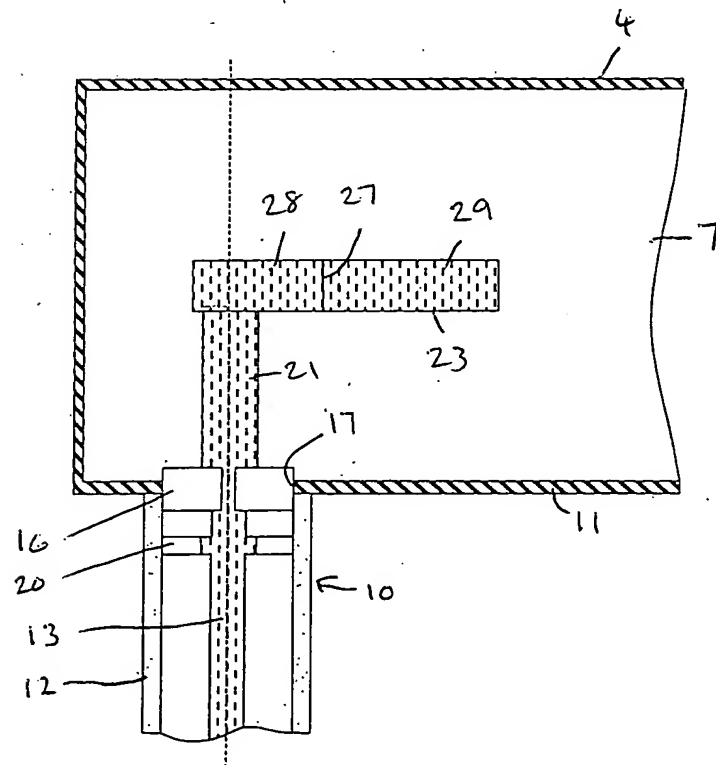
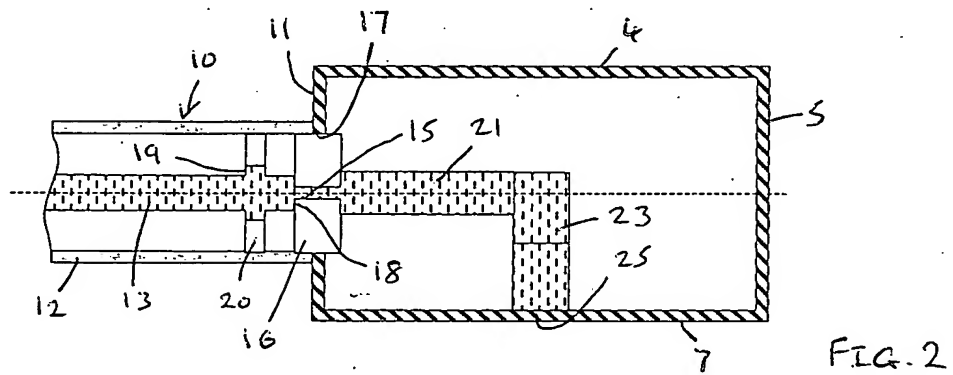
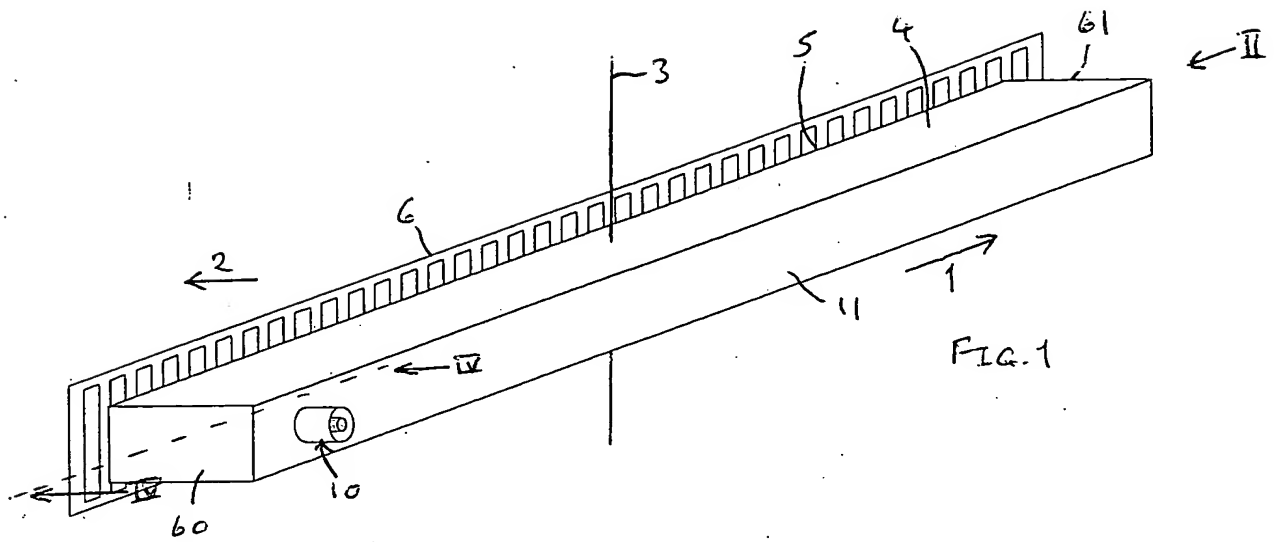
With reference now also to Figures 2 to 4, the transition 10 is mounted on a narrow wall 11 at the rear of the waveguide 4 and includes, externally, a cylindrical metal outer conductor 12, attached on the narrow wall, and a rod-like metal inner conductor 13 extending

wall 11 of the waveguide 4. This arrangement has been found to produce a very efficient transition with a wide bandwidth, typically giving a 6% bandwidth for a VSWR of better than 1.05 and an 11% bandwidth for a VSWR of better than 1.2.

Various alternative forms of transition plate are possible, as shown in Figures 5 and 6. Figure 5 shows a transition plate 23' having two steps 27' and 37' forming two quarter wave sections 29' and 39'. Figure 6 shows a transition plate 23'' with an upper edge 26'' that tapers down along its length from a location just to the right of the junction with the conductor rod 21''.

With reference now to Figures 7 to 9 there is shown an alternative transition 110 where the coaxial connection extends parallel to the length of the waveguide 104. Equivalent components to those in the arrangement shown in Figures 1 to 4 are given the same reference number with addition of 100. The inner conductor 113 of the coaxial input has a 90° bend and is formed by the combination of two cylindrical conductors 41 and 42 joined with adjacent faces 43 and 44 of a metal cube 45. The face 46 and the inner conductor 41 are configured to provide an interface to a standard 7/8" EIA connector. In other respects, the construction of the transition 110 is the same as in the arrangement of Figures 1 to 4. This transition has the advantage that the input connector and its associated cable extends parallel to the waveguide, thereby allowing for a particularly compact configuration.

1/3



2/3

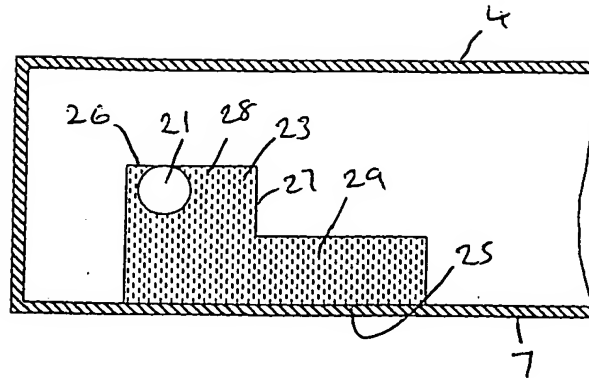


FIG. 4

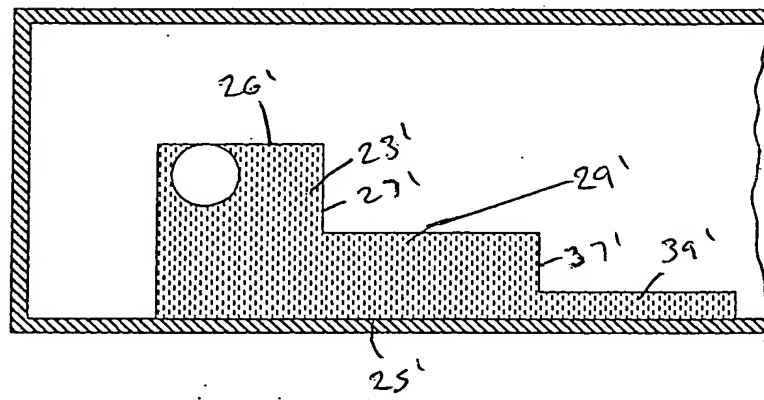


FIG. 5

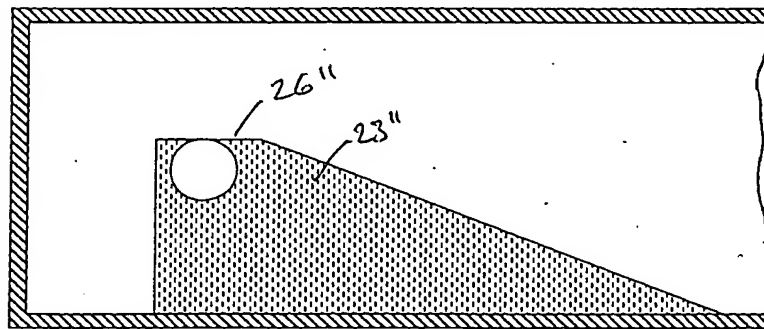


FIG. 6



